WHAT IS CLAIMED IS:

1. A method for designing a network for an Internet Service Provider (ISP) having routers that handle predetermined traffic demands and that are connected by links, the method comprising the steps of:

(a) obtaining an ordered sequence of (source-destination) pairs of routers;

(b) selecting a particular (source-destination) pair;

(c) selecting a minimum capacity for the predicted traffic demands of the selected (source-destination) pair on each potential link;

(d) finding the differential cost of the link;

(e) determining the least-cost path for the selected (source-destination) pair; and

(f) updating the current capacity and current cost of the network.

2. The method according to claim 1, further including a step (g) of determining if the particular (source-destination) pair selected in step (b) is the last (source-destination) pair in the ordered sequence of (source-destination) pairs.

3. The method according to claim 2, further including looping back to step (b) to select another particular (source-destination) pair.

4. The method according to claim 1, wherein the step of determining the least-cost path uses the Bellman-Ford method.

5. The method according to claim 1, wherein the step of determining the final network design includes using the Link Removal Heuristic (LRH) method.

6. The method according to claim 1, wherein the step of determining the final network design includes using the Flow Removal Heuristic (FRH) method.

7. A fast method for obtaining a low-cost, and possibly least cost, backbone network forming the basic infrastructure of an Internet Service Provider (ISP)

(a) consisting of the routers and the links administered and operated by the ISP – over a given set of router locations, given a traffic demand matrix, the said traffic originating from the demands of the ISP's customers, and a link distance – bandwidth cost matrix, the said cost matrix being given by a bandwidth provider, comprising

(b) providing sequential addition of traffic demands, each demand being routed over a minimum weight path, where all possible links given the router locations are considered and the link weights are assigned, for each demand by a differential cost analysis,

(c) ensuring that a demand between any ingress router and egress router (referred to as an "ingress-egress pair") is not split,

(d) ensuring symmetric routing of demands between any ingress-egress pair,

(e) ensuring hop-constrained routing, viz., that a demand between any ingress-egress pair traverses at most a pre-specified number of hops.

8. The method as claimed in claim 7, wherein the said method includes two additional methods, named Link Removal Heuristic (LRH) and Flow Removal Heuristic (FRH) that reduce cost by further refinements to the network, the said refinements being obtained by the following steps:

a) removal of a link (flow) from the network

b) updation of the network such that the removal link (flow) can be re-inserted into the network at least incremental cost.

9. The method as claimed in claim 7, wherein the said method is followed by the Surviving Single Link Failures Heuristic (SSLFH) method which incorporates survivability constraints in the design, by providing alternate paths for connections passing through a failed link, and thereby ensures sufficient spare capacity that is used in the event of single link failures, the said method consisting of a repeated application of the following steps:

a. removal of a link from the network,

b. re-routing of all demands that were routed through the above link such that the re-routing can be accomplished at least incremental cost.